

acrylonitrile, vulcanized to form an integral laminate. Physical properties of the laminate shall conform to the following:

PHYSICAL PROPERTY	SPECIFICATION LIMITS
No. of Piles	3
Laminate Weight, psf	0.85
Thickness, in. min	5/32
Tensile Strength, lb/in. of width, min	1200
Elongation at Tensile, % max	30
Elongation at 1/10 Tensile Strength, % max	3

911.13 SHIMS FOR NOISE BARRIER INSTALLATION. Shims for noise barrier installation shall be either neoprene or composite elastomer with a durometer of 60 ± 5 (Shore A) value.

SECTION 912 — COATING SYSTEMS FOR STRUCTURAL STEEL

912.01 GENERAL. The Office of Materials and Technology will maintain a list of Approved Paint Manufacturers. Only manufacturers on this list will be acceptable as sources for paint on Administration projects. Unless otherwise specified, paint shall be tested in conformance with Federal Test Method Standard 141. Only one formulation per color will be permitted per project. Tests shall be performed at 75 F and 50 percent relative humidity unless otherwise specified. All paint shall be satisfactory for brushing, rolling, or spraying. All paints within a system shall be from the same manufacturer and shall be tinted at the point of manufacture to differentiate between coats, existing coats, and bare metal. Paint shall be shipped in the original containers and all containers shall bear the identification of the paint, consisting of the manufacturer's name, the name or title of material, volume of contents, manufacturer's paint identification number, the date of manufacture, color name and number, handling instructions, precautions, and the batch number.

912.01.01 Approved Paint Manufacturers. Admission onto the list of Approved Paint Manufacturers will be based upon the acceptance of the manufacturer's submitted Quality Control Plan.

912.01.02 Quality Control Plan. The Quality Control Plan shall define the manufacturer's process to ensure that the quality of the products

during and upon completion of the manufacturing process. As a minimum, the Quality Control Plan shall list the following information:

- (a) Name of quality control tests and test procedures used.
- (b) Detailed description of the test procedures if not a standard test.
- (c) Frequency of quality control tests.
- (d) Maintenance of quality control records and length of time that they will be maintained.

912.01.03 Acceptance. The paint manufacturer shall furnish certified test results for each lot and color of paint as specified in TC-1.02. Certified test results for each lot shall list the actual test results for the specified properties. The certification shall be approved by the Office of Materials and Technology prior to shipment, and a copy shall accompany each shipment.

912.01.04 Original Infrared Spectrogram. The manufacturer shall submit an original analysis of vehicle solids by infrared spectroscopy performed as specified in D 2621 as follows:

- (a) For zinc primer coatings, infrared spectrum (2.5 to 15 μm) of each vehicle component.
- (b) For two component coatings, infrared spectrum (2.5 to 15 μm) of each single component and each mixed component, when applicable, in appropriate mixing ratios.

912.01.05 Certification Verification Tolerances. The manufacturer's facilities will be visited at random intervals, and samples will be taken. A comparison will be made between the manufacturer's certified test results and the Administration's tests results on the same batch. The tolerances between these results shall conform to the following:

TEST	TOLERANCE	TEST METHOD
Total Solids by mass, %	± 2	D 2369
Pigment Content by mass, %	± 2	D 2698 or D 4451
Vehicle Solids by mass, %	± 2	D 2369
Viscosity, KU	± 10	D 562
Unit Weight, lb/gal	± 0.5	D 1475

Volatile Organic Compound (VOC) maximum limits shall conform to the current regulations governing the point of application.

912.02 PRIMER COATS AND SEALERS.

912.02.01 Inorganic Zinc Rich. Inorganic zinc rich primer shall conform to M 300, Type I or IA. Zinc dust shall conform to D 520, Type II.

912.02.02 Aluminum Epoxy Mastic. Aluminum epoxy mastic primer shall have one component that is the condensation product of the reaction of epichlorohydrin with bisphenol A. Drying times shall be 8 hours maximum to touch, 24 hours minimum to 30 days maximum for recoat, and 48 hours maximum for hard. Minimum pot life shall be three hours. Solids by weight shall be 90 percent minimum and 80 to 90 percent by volume. Viscosity shall be 95 to 140 KU and flexibility shall pass a 180 degree bend around a 3/4 in. mandrel when tested in conformance with D 522. The material shall resist sagging when tested in conformance with D 4400 with no sagging at the manufacturer's recommended wet film thickness. The material shall weigh 13.0 ± 0.5 lb/gal.

912.02.03 Organic Zinc Rich. Organic zinc rich primer shall conform to SSPC-Paint 20, Type II.

912.02.04 Zinc Rich Moisture Cured Urethane. Zinc rich moisture cured urethane primer shall be one-component having a minimum zinc pigment content in the dry film of 80 percent. Minimum solids shall be of 80 percent by weight and 62 percent by volume. The viscosity shall be 95 to 105 KU, and shall be capable of being applied at 50 percent greater film build than required without runs or sags in conformance with D 4400. The interval for application of next coat shall be 8 hours minimum and 30 days maximum. The coating shall also conform to the Moisture Cured Urethanes Additional Performance Criteria Table except that the maximum loss for Abrasion Resistance shall be 82.0 mg, and Salt Spray after 1000 hours shall be 1/32 in. maximum.

912.02.05 Micaceous Iron Oxide And Aluminum Filled Moisture Cured Urethane. Micaceous iron oxide and aluminum filled moisture cured urethane shall have a minimum solids of 75 percent by weight and 60 percent by volume. The viscosity shall be 95 to 100 KU. The coating shall also conform to the Moisture Cured Urethanes Additional Performance Criteria Table.

912.02.06 Penetrating Sealer. Penetrating sealer shall have a viscosity of 75 to 101 KU and be able to penetrate and seal existing coatings and substrate. It shall be suitable for application over marginally prepared steel and most generic types of aged coatings. The sealer shall conform to one of the following:

- (a) Epoxy penetrating sealer shall be cross-linked amido-amine epoxy primer/sealer having two components mixed in conformance with the manufacturer's recommendations. It shall be a minimum 95 percent solids by weight.
- (b) Moisture cured urethane micaceous iron oxide filled penetrating primer/sealer shall be one component having a minimum 75 percent solids by weight. It shall also conform to the Moisture Cured Urethanes Additional Performance Criteria Table.

912.03 INTERMEDIATE COATS.

912.03.01 Acrylic. Acrylic intermediate coat shall be a single component 100 percent acrylic and have minimum solids of 48 percent by weight and 36 percent by volume. Maximum dry time to touch and recoat shall be 2 and 8 hours, respectively.

912.03.02 Epoxy Polyamide. Epoxy polyamide intermediate coat shall have one component that is the condensation product of the reaction of epichlorohydrin with bisphenol A. The epoxy polyamide shall have a 3.0 minimum fineness of grind (Hegman Units), and minimum solids of 75 percent by weight and 62 percent by volume. Maximum dry time to touch and recoat shall be 6 and 15 hours, respectively.

912.03.03 Micaceous Iron Oxide Moisture Cured Urethane. Micaceous iron oxide moisture cured urethane intermediate coat shall be one-component having minimum solids of 80 percent by weight and 60 percent by volume. The viscosity shall be 90 to 100 KU. The interval for application of next coat shall be 8 hours minimum and 30 days maximum. The coating shall also conform to the Moisture Cured Urethanes Additional Performance Criteria Table. The micaceous iron oxide content shall be a minimum of 3.0 lb/gal.

912.04 FINISH COATS. The color number will be specified in the Contract Documents and shall conform to Federal Standard 595. All finish coats shall resist sagging when tested in conformance with D 4400 with no sagging at the manufacturer's recommended wet film thickness.

912.04.01 Acrylic. Acrylic finish coat shall conform to 912.03.01.

912.04.02 Aliphatic Urethane. Aliphatic urethane finish coat shall have minimum solids of 70 percent by weight and 47 percent by volume. Drying time to touch and hard shall be the minimum recommended by the paint manufacturer.

912.04.03 Moisture Cured Aliphatic Urethane. Moisture cured aliphatic urethane finish coat shall be one-component having a maximum

free monomer content of 0.7 percent. Minimum solids shall be 75 percent by weight and 60 percent by volume, and the viscosity shall be 70 to 80 KU. The interval for application of next coat shall be 8 hours minimum and 30 days maximum. The coating shall also conform to the Moisture Cured Urethanes Additional Performance Criteria Table.

912.05 PAINT SYSTEMS. Paint systems shall be as specified in the Paint Systems Table.

PAINT SYSTEMS TABLE

PAINT	COAT	SECTION	DRY FILM THICKNESS, mils, min - max	USAGE
SYSTEM A				
Inorganic Zinc	I	912.02.01	3.0 - 5.0	Shop Primer
Acrylic	II	912.03.01	2.0 - 4.0	First Field Coat
Acrylic	III	912.04.01	2.0 - 4.0	Finish Coat
SYSTEM B				
Inorganic Zinc	I	912.02.01	3.0 - 5.0	Shop Primer
Epoxy Polyamide	II	912.03.02	5.0 - 8.0	First Field Cover-All Coat
Aliphatic Urethane	III	912.04.02	2.0 - 3.0	Finish Coat
SYSTEM C				
Organic Zinc	I	912.02.03	3.0 - 5.0	Primer/First Cover-All Coat
Epoxy Polyamide	II	912.03.02	5.0 - 8.0	Second Cover-All Coat
Aliphatic Urethane	III	912.04.02	2.0 - 3.0	Finish Coat
SYSTEM D				
Organic Zinc	I	912.02.03	3.0 - 5.0	Primer/First Cover-All Coat
Acrylic	II	912.03.01	2.0 - 4.0	Second Cover-All Coat
Acrylic	III	912.04.01	2.0 - 4.0	Finish Coat
SYSTEM E				
Aluminum Epoxy Mastic	I	912.02.02	5.0 - 8.0	Primer/First Cover-All Coat
Epoxy Polyamide	II	912.03.02	5.0 - 8.0	Second Cover-All Coat
Aliphatic Urethane	III	912.04.02	2.0 - 3.0	Finish Coat

PAINT	COAT	SECTION	DRY FILM THICKNESS, mils, min - max	USAGE
SYSTEM F				
Micaceous Iron Oxide, Aluminum Filled Moisture Cured Urethane	I	912.02.05	2.0 - 3.0	Primer/First Cover-All Coat
Micaceous Iron Oxide Moisture Cured Urethane	II	912.03.03	3.0 - 5.0	Second Cover-All Coat
Moisture Cured Aliphatic Urethane	III	912.04.03	1.5 - 2.0	Finish Coat
SYSTEM G				
Zinc Rich Moisture Cured Urethane	I	912.02.04	2.0 - 3.0	Primer/First Cover-All Coat
Micaceous Iron Oxide Moisture Cured Urethane	II	912.03.03	3.0 - 5.0	Second Cover-All Coat
Moisture Cured Aliphatic Urethane	III	912.04.03	1.5 - 2.0	Finish Coat
SYSTEM H				
Penetrating Sealer	I	912.02.06	1.0 - 2.0	Sealer
Aluminum Filled Epoxy Mastic	II	912.02.02	3.0 - 5.0	Spot Coat
Aliphatic Urethane	III	912.04.02	3.0 - 5.0	Finish Coat

**MOISTURE CURED URETHANES
ADDITIONAL PERFORMANCE CRITERIA TABLE**

TEST PROPERTY	TEST METHOD	TEST CRITERIA	COAT I & II	ENTIRE SYSTEM
Cyclic Salt Fog/UV Exposure of Painted Metal	D 5894	Final Ratings: Rusting: 6 min Blistering: 10 min Rust Creep: 6 max Cracking: Degree & Type Flaking: Degree & Type	1000 hr	3000 hr
Salt Spray	B 117	1/32 in Scribe, 1/16 in. max undercut	1000 hr	3000 hr
Abrasion Resistance	D 4060	Taber Abraser, CS-17 Wheel, 1000 g load, 1000 cycles, max loss	100 mg	56 mg
Adhesion	D 3359	Cross-Cut Tape Test	No peeling or removal	No peeling or removal
Flexibility	D 522	Conical Mandrel Bend Test, min elongation	10 %	40 %
Pencil Hardness	D 3363	min	F	F
Accelerated Weathering	G 53	QUV using UV - B Lamp, time after no more than 10 % loss of gloss	—	400 hr
Impact Resistance	D 2794	min	—	40 in.·lb
Chemical Resistance, Solutions	Fed. Spec. T-C-550 4.4.6	5 % Sodium Hydroxide 5 % Hydrochloric Acid 5 % Sulfuric Acid 5 % Acetic Acid	—	Unaffected - Slight discoloration permitted
Reversed Impact	D 2794	Rapid Deformation	—	No cracking or delamination

SECTION 913 — WATERPROOFING

913.00 CERTIFICATION. The producer shall furnish certification as specified in TC-1.02.

913.01 ASPHALTIC MATERIALS FOR DAMPPROOFING AND WATERPROOFING.

913.01.01 Hot Applied Asphalt. Hot applied asphalt shall conform to D 449.